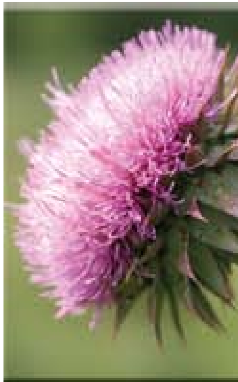
Plant Protection Programs University of Missouri

Integrated Pest & Crop Management



Soybean Cyst Nematode Management: Take the Test. Beat the Pest.

By Allen Wrather

Here is the situation: Soybean cyst nematode (SCN) is the worst pest of soybeans in the U. S. including Missouri.

Fortunately, this pest can be managed, but farmers must take steps before planting to protect their 2010 soybean crop against these nematodes.

The first step is to test the soil for SCN, and this must be done in the next few days. University of Missouri Extension Regional Agronomists have information about taking and submitting soil samples for SCN analysis, and more information is available at the University of Missouri web site http://soilplantlab.missouri.edu/nematode. The results of soil analysis for SCN will be available by early April if soil samples are submitted by late March.

The second step is to rotate crops and plant SCN resistant varieties in fields infested with this pest. These are the only useful SCN control methods available. There are no soybean seed treatments currently labeled for providing protection against SCN.

Crop rotation is a great SCN control method because SCN numbers decline during years when crops such as corn, grain sorghum, a forage crop, or cotton are planted. The number of years these crops should be planted before planting soybean again will depend on the number of SCN in the soil.

Soybean cyst nematode resistant varieties are available and most yield well. Very few varieties are resistant to all types of SCN so selecting the best variety to plant is difficult. Information about soybean variety resistance to SCN is available at University of Missouri Extension Offices, and the University of Missouri Variety Testing web site, http://agebb.missouri.edu/cropperf/vartest. Visitors to this site should select "Soybean", then select "Varieties", then select the soybean seed company of interest, and then "Submit". This site lists company provided information about varieties they sell and the source of SCN resistance used to develop each variety. Farmers should also ask the representatives for the soybean seed companies they buy from about the best SCN resistant varieties to plant in each field.

More information about SCN management is available in the University of Missouri Extension Guide titled, Soybean Cyst Nematode: Diagnosis and Management. This guide is available at http://muextension.missouri.edu/xplor/agguides/crops/g04450.htm.

The Missouri soybean farmer checkoff managed by the Missouri Soybean Merchandising Council funded much of the research by University of Missouri scientists to develop SCN resistant varieties and determine that crop rotation is a great SCN management tool.

Following these suggested procedures will give soybean farmers a better chance of producing a profitable soybean crop in 2010.

Allen Wrather
Wratherj@missouri.edu
(573) 379-5431

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Steps to Minimize Losses from Three Important Soybean Diseases

By Laura Sweets

When asked which soybean diseases consistently cause losses and which are most difficult to manage both producers and agri-business personnel in Missouri listed Phytophthora root rot, soybean cyst nematode and sudden death syndrome. All three of these diseases are caused by pathogens that are present in the soil, all three are found in all soybean producing areas of the state and all three can be difficult to manage. Management options for these three diseases rely primarily on preventative measures since effective rescue treatments are not available. These three soybean diseases along with management options are described below. For additional information and color pictures please see the University of Missouri Extension bulletin IPM1002 *Soybean Diseases*.

Phytophthora Seedling Blight and Root Rot

Phytophthora seedling blight and root rot is caused by the soil-borne fungus *Phytophthora sojae*. This soil-inhabiting fungus can cause seed decay, preemergence or postemergence damping-off, seedling blight and root rot as well as mid- to late-season wilt and death of plants. *Phytophthora sojae* produces structures called oospores, which enable it to survive from year to year in crop residues or in the soil. In the spring, the oospores germinate to produce sporangia. When soils are flooded or saturated, the sporangia release zoospores, which are attracted to the growing soybean root tip, where infection occurs.

Phytophthora seedling blight and root rot is more severe in areas that are low or poorly drained, in compacted areas or in clay or heavy soils, but the disease can appear on plants growing in lighter soils or higher grounder if the soil remains wet after planting. Significant rain after planting favors the development of *Phytophthora* in all sites. A dry period after planting drastically reduces this disease. *Phytophthora* may occur at soil temperatures as low as 50 degrees F, but greatest root damage occurs when soil temperatures are 59 degrees F or above.

Numerous races of *Phytophthora sojae* have been identified based on their ability to overcome specific Rps genes or combinations of Rps genes in soybean varieties. The most recent Missouri survey found *Phytophthora sojae* in all soybean production areas of the state. When race determinations were done on the *Phytophthora sojae* isolates recovered from 21 counties throughout the state, fourteen different races were identified with no one race being predominant.

Management options for Phytophthora seedling blight and root rot:

1. Select varieties with either race-specific resistance, tolerance or a combination of race-specific resistance and tolerance, especially for use in fields with a history of *Phytophthora*. Race-specific varieties contain a single gene or combination of genes (i.e., Rps1c, Rps1d, Rps1k, Rps3a, etc.) that confer resistance to specific races of *Phytophthora sojae*. Tolerant varieties have a non-race specific, partial resistance and may also be called field-resistant varieties.
2. Plant in good seedbed conditions.
3. *Phytophthora* is more likely to occur in low, wet areas, poorly drained areas or compacted areas of a field. Tiling to improve drainage and taking steps to reduce or prevent compaction may help minimize disease problems.
4. Avoid the application of high levels of manure or fertilizer (KCl) just before planting.
5. Use an appropriate fungicide seed treatment. Products containing either metalaxyl or mefenoxam as an active ingredient are particularly effective against water mold fungi such as *Phytophthora sojae*. If high disease pressure is expected, the use of the higher rate of these seed treatment fungicides may be necessary.

Soybean Cyst Nematode (SCN)

The soybean cyst nematode, *Heterodera glycines*, is a serious problem throughout Missouri and in most soybean producing areas of the United States. Three different surveys for SCN in Missouri have shown that approximately 75% of the surveyed fields have detectable levels of SCN.

Symptoms of SNC range from no obvious symptoms to subtle differences in plant height and vigor or unexpected decreases in yield to severe stunting and discoloration of plants or dead plants. If plants are carefully dug up, females may be evident on the roots. The females appear as tiny (smaller than nitrogen-fixing nodules), whitish to yellow to brownish, lemon-shaped structures on the roots. Symptom expression may be more severe if plants are subjected to other stresses such as moisture stress, nutrient deficiencies, herbicide injury, insect damage or other diseases. The cysts are the bodies of the dead female nematodes. The cysts are actually protective egg cases that contain up to 250 SCN eggs. Eggs in cysts may survive in the soil for extended periods of time even in the absence of soybean crops.

Anything that moves cyst-infested soil can spread SCN, including machinery, animals, migratory birds, people, wind, water and soil peds associated with seed. Once in a field, SCN may take several years to build up to damaging levels. Unfortunately, once SCN is in a field it is likely to be there forever.

Management options for soybean cyst nematode:

1. Employ a program of soil sampling to identify problem fields and to determine the extent and severity of the problem within the field. For more detailed information on soil sampling for SCN refer to University of Missouri publication G4450, *Soybean Cyst Nematode: Diagnosis and Management*

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or the Plant Nematology Laboratory website http://soilplantlab.missouri.edu/nematode/ .

2. Select resistant varieties. Most commercial varieties with resistance to SCN have PI88788 as the source of SCN resistance. If PI88788 resistant varieties have been used in the same field for a number of years, that resistance source may not be performing as well as it initially did. If possible rotate to another source of resistance or at least to a different PI88788 variety.
3. Rotate to non-host crops.
4. Maintain good plant vigor.
5. Maintain good weed control.
6. Avoid spreading SCN from infested fields to uninfested fields by working uninfested fields first before moving equipment to infested fields.
7. Although several nematicides are labeled for use on soybeans, economic and environmental concerns limit their use.

Sudden Death Syndrome (SDS)

In Missouri, sudden death syndrome (SDS) has been a problem primarily in river bottom fields in the central and eastern portions of the state. However, the pathogen *Fusarium virguliforme* (formerly called *Fusarium solani* f. sp. *glycines*), appears to be present in soybean-producing areas throughout the state. In years when environmental conditions are favorable for infections and symptom development such as 2008 and 2009, SDS may be found in most areas of the state.

SDS has been associated with maximum yield potential soybean production, that is, fields with optimum fertility, irrigation and lime applications. Field observations suggest that SDS is more likely to occur and to be more severe with high soil moisture, whether that is supplies by rainfall or irrigation. High soil moisture during vegetative stages of soybean growth seems to be most conducive to disease development. Because early-planted fields have a longer exposure to spring rainfalls than later-planted fields, seedlings in early-planted fields have an increased susceptibility to infection by the SDS pathogen. Later-planted fields in which soybean plants miss early spring rains may have lower levels of root infection and lower levels of SDS throughout the season. The onset of SDS symptoms is associated with wet conditions and below normal temperatures at or near bloom.

Management options for sudden death syndrome:

1. Select varieties that have performed well where SDS has been a problem.
2. Improve drainage in poorly drained fields and avoid compacting soils.
3. Stagger planting dates and delay planting until soils are warm and dry.
4. Rotate crops; avoid continuous soybean cropping.
5. Maintain good crop vigor and avoid crop stress, including soybean cyst nematode.
6. Harvest fields with SDS in a timely fashion.

Laura Sweets
SweetsL@missouri.edu
(573) 884-7307

Manure Testing for Proper Nutrient Management

By Manjula V. Nathan

Manure is a valuable source of nutrient for crops and improved soil productivity. Manure testing is necessary to make optimum use of manure nutrients while minimizing environmental impact of over application. Book values are of little use due to rapidly changing diets and the impact of farmer management on the nutrient content of manure. The EPA revised Concentrated Animal Feeding Operation (CAFO) rule (affecting permitted operations) and the Natural Resource Conservation Service (NRCS) Agronomy Standard (590) require annual testing of manure storages as part of the nutrient management planning process.

The MU Soil and Plant Testing Lab began offering manure testing services in 2008 to meet the increasing need for this service by our clients. The lab uses the recommended tests for manure analysis and reports results on as is basis. The lab also participates in the manure analysis certification program to ensure quality of results.

It is interesting to note the high degree of variation found in the samples received by the lab. Table 1 presents the manure nutrient analysis summary for the samples tested by MU soil and plant testing lab. Even though the standard book values for average nutrient contents are available, they are not of much value due to the variation that exists between manure storage and handling systems. This summary shows the variation found between different sources and manure handling systems (Table 1). The wide variability observed among samples received emphasizes the need for testing each source of manure so that the growers can have a better estimate of nutrients applied to the field and adjust the supplemental application of inorganic fertilizers accordingly. To get an estimate of plant available nitrogen and recommended application rate based on manure test results, method of application and target nitrogen rate, visit Dr. John Lory's Resources for Nutrient Management Planners website at: http://nmplanner.missouri.edu/tools/pan_calculator.asp.

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Potential Alfalfa Weevil Problems in 2010

By Wayne Bailey

The alfalfa weevil is an insect which benefits from mild weather during fall, winter, and spring months. When temperatures rise above 50OF for several consecutive days during these seasons, adult weevils will deposit eggs in old stubble or in new spring growth of alfalfa. Although high numbers of alfalfa weevil eggs present in the spring do not always result in economic infestations of larvae, the potential for damage is greater in years when this condition exists. Alfalfa weevil eggs develop and eventually hatch after accumulating about 300 degree day heat units based on 48OF. This means that infestations of alfalfa weevil larvae often occur first in more southern counties of Missouri and sooner on south-facing slopes of alfalfa fields due to the faster warming of these slopes in early spring.

Although problems with alfalfa weevil have yet to occur this spring, producers in the southern counties of Missouri should scout fields on a weekly schedule beginning now and continue through first harvest. Producer in central and northern counties should begin scouting for alfalfa weevil within the next two weeks. The first damage observed will be small feeding holes in alfalfa leaflets as they grow out of the terminals of plant stems. This minor foliage damage is caused by the 1st and possibly 2nd larval (worm) stages called instars. As larvae grow larger (3rd and 4th instars) they cause very visible foliage feeding which often results in substantial economic loss.

Scouting for alfalfa weevil is accomplished by randomly collecting 50 alfalfa stems (10 stems at 5 different locations) and tapping them into a white bucket. Larvae will generally be dislodged by this action and allow for an average number of larvae per alfalfa stem to be calculated. Caution should be used when collecting stems as larvae can be easily dislodged from the growing tip of the plant stem by rough handling. It is recommended that the top of the alfalfa stem be cupped in one hand while the plant stem is removed near the base of the stem by cutting with a knife. If an average of one or more larvae per stem is found and 30% of plants exhibit larval damage, then the economic threshold has been reached and control is justified.

Management Options

The main management option for early infestations of alfalfa weevil larvae on small alfalfa is an application of a labeled insecticide. Early harvest of the alfalfa by either machine or livestock may be viable options for some producers in Missouri. If early harvest of alfalfa by machine is selected as a control strategy, then the crop is harvested approximately 7-10 prior to the normal plant growth stage of 1/10nth bloom. Missouri data indicate that alfalfa weevil larval numbers are reduced by about 95 - 98% with mechanical harvest and about 90% by cattle grazing in a management intensive grazing system. Producers using grazing as a control strategy must be aware of the bloat risk to cattle grazing green alfalfa and risk to the alfalfa stand due to hoof trampling during wet conditions. If an insecticide application is selected, a list of insecticides recommended for alfalfa weevil larval control follows.

Table 1. Recommended Insecticides for Management of Alfalfa Weevil Larvae - 2010

Chemical Name	*Common Name*	*Rate of Formulated Material*	*Rate of Active Ingredient (a.i.)*
Beta-cyfluthrin	*Baythroid XL	1.6 to 2.8 fl oz/acre	0.0125 to 0.022 lb a.i./acre
Cholopyrifos	*Lorsban Advanced	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
Chlorpyrifos 4E	*Lorsban 4E	1 to 2 pts/acre	0.5 to 1 lb a.i./acre
	*numerous products	see specific labels	see specific labels
Chlorpyrifos 4E plus			
Gamma-cyhalothrin	*Cobalt	19.0 to 38.0 fl oz/acre	
Gamma-cyhalothrin	*Proaxis	2.56 to 3.84 fl oz/acre	0.02 to 0.03 lb a.i./acre
Lambda-cyhalothrin	*Warrior	2.56 to 3.84 fl oz/acre	0.02 to 0.03 lb a.i./acre
	*numerous products	see specific labels	see specific labels
Methyl Parathion	*Chemnova Methyl 4EC	1 pt/acre	0.5 lb a.i./acre
Phosmet	Imidan	see specific label	see specific label
Zeta-cypermethrin	*Mustang Max EC	2.24 to 4.0 fl oz/acre	0.014 to 0.025 lb a.i./acre

Read and follow all label direction, precautions, and restrictions.
**Designated a restricted use product.*

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Potential Alfalfa Weevil Problems in 2010

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Insect Larvae in Early Season Alfalfa

The larvae of two weevils, the clover leaf weevil and the alfalfa weevil, may be found in Missouri alfalfa fields prior to first harvest. Although they both feed on alfalfa foliage and look similar in appearance, only the alfalfa weevil is considered a severe pest of alfalfa in this state. How do we tell them apart in the field so we don't apply unneeded insecticide applications?

The following list compares identifying characteristics of larvae of these two alfalfa weevils:

Clover Leaf Weevil (CLW)

- Appear in fields in early season, often March and April
- Larvae look similar to AW larvae, but are larger in size, have a white stripe running down the back that is often bordered by patches of pink or rosy pink areas or flecks.
- Head capsules are brown in color
- Larvae feed at night and generally spend the day on the ground near the plant or in the plant crown.
- A large majority of CLW larvae are often parasitized by one to several larvae of a parasitic wasp species.
- Feeding damage is seen as circular holes cut into the alfalfa leaflets
- Populations of CLW rarely reach economic levels, so they rarely require insecticide applications to reduce or prevent damaging populations

Alfalfa Weevil (AW)

- Larvae appear in fields about two weeks later than CLW (late March, April and May depending on location in state)
- Larvae have brown to black head capsules (sometimes difficult to distinguish from CLW larvae)
- AW larvae always feed on the alfalfa plant foliage and are not found on the ground
- Parasitism rates rarely exceed 15% in most areas of the state
- Small larvae (1st and 2nd instars) feed inside growing plant terminals which produces shot-hole damage on plant leaflets as they grow out of the terminal. Older larvae (late 2nd, 3rd, and 4th instars) substantially reduce forage quality of the alfalfa by skeletonizing and defoliating plant leaflets
- Common pest of first cutting alfalfa in Missouri, especially in the southern half of the state.

Wayne Bailey
BaileyW@missouri.edu
(573) 864-9905

Wireworm Baits and Preplant Decisions for Corn

By Wayne Bailey

Wireworm is a group of insects which are often difficult to scout and manage. One method used to determine wireworm numbers prior to planting is the use of a solar baiting system. It can effectively estimate wireworm larval populations present at a site.

The scouting technique consists of placing bait stations or traps at several locations within a crop field. A minimum of two bait stations per acre is recommended, but in reality establishing 5 to 10 bait station per 30 to 40 acres of crop field should be sufficient if traps are properly located. In order to gain accurate estimates of the wireworm population, traps should be located in high risk areas such as in any grassy areas of the field or in areas where wireworms caused injury in previous seasons. Although trap placement in fields may occur 2-3 weeks prior to planting of the corn crop, traps placed 7-10 days prior to planting provide more accurate estimates of wireworm numbers as wireworms often remain deep in the soil until soil temperatures warm in the spring. With wet conditions and planting dates rapidly approaching in 2010, 7-10 days of monitoring should be sufficient to estimate wireworm populations in field crops.

This Wireworm trapping technique consists of digging a 4-inch deep by 6-9 inch wide hole at the soil surface. Place into the hole 1 cup of equal mixture of untreated corn and wheat seed which has be pre-soaked for 24 hours prior to use in order to speed up seed germination.. Fill and slightly mound each station with soil. Cover each mound with an 18-inch square of black polyethylene plastic (appropriate sized trash bag) followed by a 1-yard square sheet of clear polyethylene or similar clear plastic bag. Cover the edges of the plastic layers with soil to prevent wind damage. The black plastic layer absorbs heat and the clear plastic helps retain heat in the soil producing a "greenhouse effect" which allows for more rapid germination of the bait seed. Carbon dioxide is produced during the germination process and attracts wireworms to the bait. Just prior to planting, remove the plastic layers and soil from the bait and count the number of wireworm larvae in and around the germinating ball of bait seed. If the average number of wireworm larvae collected in bait stations located in the field average one or more per bait station, the economic threshold has been exceeded and treatment is justified. If an economic infestation is found, control options

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Wireworm Baits and Preplant Decisions for Corn

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implemented before or at the time of planting are recommended. Management options include such strategies as use of liquid or granular insecticides at planting or planting insecticide treated seed. Rescue treatments for this soil inhabiting insect pest are not available at this time.

Table 1. Recommended Insecticides for Field Corn- 2010

Insect	*Common Name*	*Trade Name*	*Rate of Formulated Material Per Acre*	*Placement*	*Comments*
Wireworm	tebupirimphos + cyfluthrin	***Aztec 2.1G**	6.7 oz./1000 ft. row	Band, furrow with incorporation	Treatment is justified if field has chronic history of wireworm problems or if the number of wireworm larvae collected from solar bait stations exceed the economic threshold (average of one or more per trap).
	tebupirimphos + cyfluthrin	***Aztec 4.67**	3 oz./1000 ft. row	Band, furrow with incorporation	
	bifenthrin	***Brigade 2EC**	0.15 to 0.3 fl. oz./1000 ft. row	Band, furrow	
	bifenthrin	***Brigade 2EC**	3 to 4 fl. oz.	Broadcast-PPI	
	bifenthrin	***Capture LFR**	3.4 to 6.8 fl. oz	Bad, furrow	
	terbufos	***Counter 15G**	6 oz./1000 ft. row	Band, furrow	
	bifenthrin	***Fanfare 2EC**	0.15 to 0.3 fl. oz./1000 ft. row		
	bifenthrin	***Fanfare 2EC**	3 to 4 fl. oz.	Broadcast-PPI	
	tefluthrin	***Force 3G**	4 to 5 oz./1000 ft. row	Furrow	
	tefluthrin	***Force CS**	0.46 to 0.57 oz./1000 ft. row	Furrow	
	chlorethoxyfos	***Fortress 2.5G**	6 to 7.5/1000 ft. row	Furrow	
	chlorethoxyfos	***Fortress 5G**	3 to 3.75 oz./1000 ft. row	Furrow	
	carbofuran	***Furadan LFR**	2.5 fl. oz./1000 ft. row	Broadcast-PPI	
	chlorpyrifos	***Lorsban 4E**	4 pt.	Furrow	
	chlorpyrifos	***Lorsban 15G**	8 oz./1000 ft. row	Band, Furrow	
	gamma-cyhalothrin	***Proaxis**	0.66 fl. oz./1000 ft. row	Broadcast-PPI	
	chlorpyrifos	***Nufos 4E**	4 pt.	Furrow	
	chlorpyrifos	***Nufos 15G**	8 to 16 oz./1000 ft. row	Furrow	
	fipronil	***Regent 4SC**	0.24 fl. oz./1000 ft. row	Band only, see label	
	phorate	***Thimet 20G**	6 oz./1000 ft. row	Band	
	lambda-cyhalothrin	***Warrior**	0.66 fl. oz./1000 ft. row		
Seed Treatments	thiamethoxam	**Cruiser**	See product label	On seed	
		Poncho	See product label		
		Regent TS	See product label		

Wayne Bailey
BaileyW@missouri.edu
(573) 864-9905

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Table 1. Manure Nutrient Analysis Summary for Samples Received by MU Soil and Plant Testing Lab

Source		*N* % *Wet Wt basis*	*P* % *Wet wt basis*	*K* % *Wet wt basis*	*NH4* *ppm* *Wet wt basis*	*pH*	*EC*	*DM* %	*Moisture* %
Poultry	MAX	4.54	3.94	5.19	16117.0	8.7	25.0	98.3	68.3
	MIN	0.29	0.09	0.27	733.0	5.0	4.7	31.7	1.7
	Mean	2.474	1.198	1.840	6394	7.40	15.44	63.5	36.5
	Range	0.29-4.54	0.09-3.94	0.27-5.19	733-16117	5.0-8.7	4.67-24.99	31.7-98.3	1.7-68.3
	Number	124	124	124	52	54	48	124	124
Dairy concrete pit	MAX	2.25	1.84	0.74	4713.00	8.08	27.80	53.30	99.23
	MIN	0.09	0.01	0.05	244	6.71	2.86	0.8	46.7
	Mean	0.572	0.235	0.322	1052	7.58	8.07	22.1	77.9
	Range	0.09-2.25	0.01-1.84	0.05-0.74	244-4713	6.7-8.1	2.9-27.8	0.8-53.3	47 -99
	Number	16	16	16	14	9	8	15	15
Beef stacked pile	MAX	1.76	0.50	3.48	950	9.12	5.49	84.7	81.3
	MIN	0.34	0.10	0.10	3	5.17	1.05	18.7	15.3
	Mean	0.77	0.21	0.59	351	7.56	2.62	48.1	51.9
	Range	0.34-1.76	0.01-0.50	0.1 -3.5	2.7-950	5.2-9.1	1.1 -5.5	18.7-84.7	15.3-81.3
	Number	30	30	30	13	12	10	30	30
Dairy/Beef lagoon	MAX	0.11	0.02	0.22	557	9.2	14.2	0.92	99.9
	MIN	0.00	0.00	0.01	0.19	7.2	1.2	0.10	99.1
	Mean	0.021	0.005	0.054	120	8.3	3.9	0.28	99.72
	Range	0.00-0.11	0.00-0.02	0.01-0.22	0.19-557	7.2-9.2	1.2-14.2	0.1 -0.92	99.1-99.9
	Number	8	8	8	8	7	7	8	8
Swine Concrete Pit	MAX	2.66	1.40	2.41	4684	7.8	24.3	70.7	99.6
	MIN	0.06	0.01	0.06	705	7.4	7.89	0.4	29.3
	Mean	0.583	0.201	0.404	2860	7.57	16.34	9.5	90.5
	Range	0.06-2.66	0.01-1.40	0.06-2.41	705-4684	7.4-7.8	7.9-24.3	0.4-70.7	29.3-99.6
	Number	17	17	17	13	7	7	17	17
Swine lagoon	MAX	0.76	0.74	0.33	2778	7.93	24.3	13.6	100.0
	MIN	0.00	0.00	0.00	6	7.2	0.5	0.0	86.4
	Mean	0.171	0.091	0.122	555	7.6	6.0	2.7	97.3
	Range	0.00-0.76	0.00-0.74	0.00-0.33	6 to 2778	7.2	0.5	0.0	86.4
	Number	20	20	20	13	8	8	20	20
Horse	MAX	0.76	0.23	0.82	2275	8.7	2.5	79.4	78.5
	MIN	0.19	0.05	0.19	495	7.1	2.1	21.5	20.7
	Mean	0.36	0.11	0.41	1282	8.2	2.3	45.3	54.7
	Range	0.19-0.76	0.05-0.23	0.19-0.82	495-2275	7.1-8.7	2.1-2.5	21.5-79.4	20.7-78.5
	Number	9.0	9.0	9.0	5.0	4.0	4.0	9.0	9.0

Submitting Samples to the Lab

Obtaining a representative manure sample from each storage area is critical to getting accurate test results. The basic guideline is to collect multiple samples, mix them together and make a composite sample.

Taking a representative sample: Obtain samples from at least 10 different places and/or depths to make the composite sample. In the case of poultry litter, sample to the bottom of the litter. If possible, agitate the liquids before collecting the sample.

Submitting dry samples: Submit one quart of dry manure in a Ziploc bag, squeeze excess air from the bag and seal it. Complete the manure testing sample information form and make sure to write your sample number or ID on the bag and mail it to the lab.

Submitting wet samples: Submit one pint of liquid manure in a plastic container. Do not fill the container. Make sure to leave at least one third free space and tighten the cap securely. Complete the manure testing sample information form and write your sample number or ID on the container with permanent ink and mail it to the lab.

Each sample submitted to the lab should be accompanied by a Sample Information Form and a check for the amount due payable to MU Soil Testing. When submitting a sample the Sample Information Form should be filled out accurately and completely. A Complete Manure Analysis Test package includes total nitrogen, phosphorus, potassium, ammonium nitrogen, pH and salt content (EC), and percent moisture costs $40 per sample. A Basic Manure Analysis Test package includes Total nitrogen, phosphorus, and potassium and percent moisture costs

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Manure Testing for Proper Nutrient Management

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$22 per sample. The turn around for manure analysis is 3 to 5 working days. Additional Information on submitting samples to the lab, sample information forms and fees can be obtained by visiting the lab's website at: http://soilplantlab.missouri.edu/soil/

For additional information refer MU Guides:

EQ 215 Laboratory analysis of manure

G 9340, Sampling poultry litter for nutrient testing

G 9186: Calculating plant available mitrogen and residual nitrogen fertilizer value in manure.

Manjula Nathan
NathanM@missouri.edu
(573) 882-3250

Assessing Wheat Yield Potential in Spring

By Bill Wiebold

Last fall we were concerned that wet fall weather would impact wheat planting and potential wheat yield. Soybean and corn harvests were delayed well past the Hessian Fly free date. This meant that wheat planting was prevented or wheat was planted after the optimum planting date. The Missouri Agricultural Statistics Service estimated that planted wheat acreage in Missouri was less than 450,000 acres. Unfortunately, many of these acres are suboptimal for stand may need to be abandoned.

In the November 3, 2010, issue of the *Integrated Pest & Crop Management* newsletter I discussed the difficulty of predicting the response of wheat yield to planting date. The complication is that seedling emergence and grain-filling occur in two different years separated by a winter dormant period. The effect of planting date on wheat yield is highly dependent on weather conditions between planting and establishment of dormancy. To maximize yield, wheat plants must accomplish three things during the autumn growth period: develop a root system to resist heaving, store sugars associated with winter hardening, and produce tillers to increase head number.

Figure 1. A wheat plant with a main stem and three good-sized tillers.

Autumn weather in 2009 was not kind to wheat plants. Cool weather slowed overall wheat growth and inhibited tillering. Tillers are important because they produce grain heads in the spring. Normal production of tillers triples or quadruples the number of heads. Wheat yield is severely decreased by inadequate tiller development.

Many farmers are discovering that their wheat plants produce few if any tillers last fall. Wheat plants are able tiller in the spring, and early spring application of nitrogen may increase the number of tillers. Wet winter and early spring weather prevented early application of fertilizer. Even if it had been possible to apply fertilizer, it is unlikely that spring tillering could have produce enough tillers to maintain yield potential.

The science of predicting wheat yield from tiller counts is imprecise. As a starting point, it takes about 60 heads per square foot to maximize yield. The formula to estimate yield with fewer than 60 heads is mostly a guess. A conservative approach would be to use a linear relationship. In other words, a field that averages 30 heads per square foot would yield 50% of whatever the yield potential of that field might be. Few things in nature follow a straight line, so this approach might underestimate yield potential of Missouri wheat plants. But, I believe in most instances this calculation will provide at least part of the information needed to determine whether to retain a weak wheat stand or abandon it for another crop.

Bill Wiebold
WieboldW@missouri.edu
(573) 882-0621

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Weather Data for the Week Ending March 29, 2010

By Pat Guinan

Station	County	Weekly Temperature (ºF)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	March 1-March 29	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	58	36	69	31	47	+1	3.20	+1.29	*	*
St. Joseph	Buchanan	56	37	65	31	46	-1	2.82	+0.89	*	*
Brunswick	Carroll	58	37	70	31	47	-1	2.28	+0.01	*	*
Albany	Gentry	56	34	66	27	46	0	2.54	+0.43	*	*
Auxvasse	Audrain	60	37	71	28	48	+1	2.43	-0.17	*	*
Vandalia	Audrain	59	35	70	26	47	+1	2.39	-0.38	*	*
Columbia-Bradford	Boone	60	35	71	28	47	-2	2.96	+0.19	*	*
Columbia-Jefferson Farm	Boone	61	37	72	30	49	0	2.71	-0.06	*	*
Columbia-South Farms	Boone	60	37	71	29	48	-1	3.11	+0.34	*	*
Williamsburg	Callaway	60	6	72	28	48	+1	2.22	-0.57	*	*
Novelty	Knox	57	34	68	27	46	-1	2.07	-0.28	*	*
Linneus	Linn	57	35	69	29	46	0	1.86	-0.34	*	*
Monroe City	Monroe	58	35	69	26	46	-1	2.09	-0.37	*	*
Versailles	Morgan	63	38	75	31	50	0	2.75	+0.03	*	*
Green Ridge	Pettis	60	37	71	33	48	0	2.11	-0.49	*	*
Lamar	Barton	61	39	70	33	49	-1	2.54	-0.70	*	*
Cook Station	Crawford	64	34	74	27	48	-2	3.08	-0.26	*	*
Round Spring	Shannon	64	33	75	29	48	-1	3.37	-0.16	*	*
Mountain Grove	Wright	60	37	69	29	48	0	3.09	-0.40	*	*
Delta	Cape Girardeau	59	39	66	32	49	-2	5.18	+1.34	*	*
Cardwell	Dunklin	62	42	69	37	52	-1	4.22	+0.33	*	*
Clarkton	Dunklin	61	40	69	32	50	-2	4.63	+1.24	*	*
Glennonville	Dunklin	61	41	68	35	51	-1	4.25	+0.86	*	*
Charleston	Mississippi	60	40	68	34	50	-1	4.71	+1.29	*	*
Portageville-Delta Center	Pemiscot	61	43	69	35	52	-1	5.37	+1.80	*	*
Portageville-Lee Farm	Pemiscot	62	42	70	35	52	-1	4.75	+1.18	*	*
Steele	Pemiscot	62	43	69	36	52	-1	4.48	+0.60	*	*

* Complete data not available for report

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

Weather Data provided by ***Pat Guinan***
GuinanP@missouri.edu
(573) 882-5908